

PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES
FOURTH SERIES

VOL. XIX, No. 8, pp. 85-93, 7 text figures

JULY 15, 1930

VIII

FOSSIL BIRD REMAINS FROM THE TEMBLOR FORMATION NEAR BAKERSFIELD, CALIFORNIA

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Collections of fossils made by Mr. Charles Morrice in the Temblor deposits of the Miocene near Bakersfield include several bones of birds that are of considerable interest in adding to our scanty information of the rich avifauna of the latter part of the Tertiary from an entirely new area. The specimens in question from information obtained through Dr. G. Dallas Hanna, and Dr. Remington Kellogg, were collected in 1924 by Mr. Charles Morrice in a stratum of unconsolidated sandy material exposed on the slopes of an eminence known as Sharktooth Hill, west of Round Mountain, four miles east of the Kern River oil field, one-half mile north of Kern River, and about seven miles northeast of Bakersfield, Kern County, California. The exact location is on the north side of Kern River in Sec. 25, T. 28 S., R. 28 E., M. D. M. The elevation of the hill is given on the Caliente sheet of the U. S. Geological Survey's Topographic map as 642 feet above sea-level, but the hill on the map in question is not there named. The deposit which is in the uppermost fossil horizon of the Temblor Miocene has furnished many bones of marine vertebrates, consideration of which has led Dr. Kellogg to

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believe that the beds are equivalent in age to the Helvetian stage of the European Miocene. A study of the diatoms exposed in a stratum a few feet below the bone bearing layer has indicated to Dr. Hanna that the age there may likewise be the equivalent of the Helvetian of the European Miocene.

The first of the bird bones received, the gannet, was sent to me some time ago by Dr. Loye Miller for an opinion as to its generic allocation, followed by the request that I describe it. The specimens of *Puffinus* come through Dr. G. Dallas Hanna from the California Academy of Sciences, and the remaining material was placed in my hands by Dr. Remington Kellogg. The collection, though small, contains three species new to science.

The booby and the two shearwaters identified among the birds are of groups of distinctly marine habit, so that it seems logical to suppose that the goose was a form of similar preference in range.

Drawings illustrating these specimens have been made by Mr. Sydney Prentice.

Family PROCELLARIIDÆ

1. *Puffinus inceptor* Wetmore, new species

Characters.—Similar to the modern *Puffinus tenuirostris*¹ (Temminck) but smaller; radial and ulnar trochleæ relatively smaller; incisura capitis more open; ectepicondylar process relatively more slender.

Description.—Type (figs. 1-3), lower portion of right humerus, Calif. Acad. Sci. No. 5223, from the upper level of the Temblor Miocene on **Sharktooth Hill, about seven miles northeast of Bakersfield, Kern County, California**, in Sec. 25, T. 28 S. R. 28 E., M. D. M., collected in 1924 by Charles Morrice.

Shaft obliquely flattened so that it is an elongate ellipse in outline; ectepicondylar process an acute triangle in general outline, thin, with upper margin forming a right angle with the longitudinal axis of the shaft, and lower margin sloping

¹*Procellaria tenuirostris* Temminck, Planch. Col., vol. 5, 1835, text for pl. 587

upward at a forty-five degree angle with the same axis, in dimension relatively small as compared with modern shearwaters; depression for brachialis inferior roughly elliptical, deeply impressed, with sharply defined outline; ectepicondylar process slight, merging with shaft at level of distal margin of ectepicondylar process; radial condyle relatively small, outer



Figs. 1-3.—Three views of type of *Puffinus inceptor*, natural size.

surface flattened; ulnar condyle likewise relatively small, narrow, with free margin compressed, bladelike, descending at a right angle to join lower end of shaft; intertrochlear sulcus broadly open, in form a right triangle at bottom. Bone dull brown in color, well fossilized.

Measurements. — Transverse breadth across trochlea 12.2 mm.; transverse breadth of shaft 5.9 mm.; height of ectepicondylar process 4.6 mm.; breadth of ectepicondylar process at base 4.6 mm.

Remarks.—Though in the diagnosis the present form is compared with *Puffinus tenuirostris* in relative proportions of trochleæ and ectepicondylar process, and in the breadth of the intertrochlear sulcus, it differs in the points indicated from all the modern shearwaters examined. In size, *inceptor* is near the wedgetailed shearwater, *Thyellodroma cuneata*. It is larger than the fossil *Puffinus diatomicus* L. H. Miller, from the Lompoc Miocene of California, and smaller than *Puffinus conradi*, described from a specimen from the Calvert Miocene of Maryland, and *Puffinus eyermani* Shufeldt, from the Pleistocene of Sardinia.

The type specimen of *P. inceptor* includes approximately the distal fourth of the humerus, with the shaft somewhat broken, and a little wear on the trochlea but otherwise complete.

With description of the present form there are known three species of shearwaters from the Miocene of North America: *Puffinus conradi* Marsh, Calvert formation of Maryland; *Puffinus diatomicus* L. H. Miller, Lompoc of California; and *Puffinus inceptor* Wetmore, Temblor of California.

As three sizes and types are represented in this series of species it appears that the group comprised in the shearwaters was as well diversified in the seas of the Miocene as it is over our modern oceans.

The study of *Puffinus inceptor* has led to consideration of the fossil species of this group known for the entire world and has brought to attention the name *Puffinus arvernensis* which is given by Alphonse Milne-Edwards in the work entitled *Recherches anatomiques et paléontologiques pour servir à l'histoire des Oiseaux Fossiles de la France*, vol 2, 1870, p. 572, with the statement "Cette espèce, ayant été découverte depuis la publication du chapitre relatif aux oiseaux fossiles de cette famille, sera décrite et figurée dans un travail supplémentaire." There is no description here, so that it remains as a *nomen nudum*. It seems to have been overlooked, however, that Dr. R. W. Shufeldt, in describing *Puffinus eyermani*, in the Proceedings of the Academy of Natural Sciences of Philadelphia, December 8, 1896, p. 511, plate 24, figs. 1-2, has definitely named *Puffinus arvernensis*. According to Shufeldt (l. c. p. 510) he wrote to Prof. Milne-Edwards to ask concerning the identity of *P. arvernensis*, and the latter under date of July 9, 1896, sent him a drawing of the metatarsus of that species, saying that it came from St. Gerand le Puy, and giving Shufeldt permission to use it as he saw fit. This drawing Dr. Shufeldt published in the paper cited above, and in addition identified a tibio-tarsus, two humeri and a coracoid from Sardinia as probably that species. On the basis of Shufeldt's published figure of the metatarsus, this species is here identifiable, and will stand therefore as *Puffinus arvernensis* Shufeldt, to be cited from Dr. Shufeldt's paper.

2. *Puffinus* sp.

With the type of *Puffinus inceptor*, there was found part of a right humerus, California Acad. Sci. No. 5224, that represents a species of *Puffinus*. This specimen comprises a little less than the distal half of the bone with the ectepicondylar process broken away but otherwise with little wear. In size of the articular portion this bone is similar to the modern *Puffinus creatopus*, but the shaft is much heavier, being about the dimension of that of the living *P. gravis*. On comparison with the type specimen of *Puffinus conradi*, described from the distal part of a left humerus from the Calvert formation of the Miocene of Maryland, the fossil here under discussion is found to agree with remarkable closeness in its conformation, differing principally in slightly smaller dimension. In view of its fragmentary condition there is little more that may be said regarding the Temblor specimen except to state from the fragment at hand it is apparently of a form closely allied to *P. conradi* of the Miocene of the east coast.

Following are dimensions of the California fossil: transverse breadth of distal end 12.8 mm.; transverse diameter of shaft 6.9 mm. For the type of *P. conradi* these measurements are 13.4 and 7.1 mm. respectively.

Family SULIDÆ

3. *Moris vagabundus* Wetmore, new species

Characters.—Similar in form to *Moris serrator* (Gray)² but decidedly smaller.

Description.—Type, (fig. 4), distal end of right humerus, Univ. Calif. Mus. Pal. Cat. No. 31062, from the upper level of the Temblor Miocene of Sharktooth Hill, about seven miles northeast of Bakersfield, Kern County, California, in Sec. 25, T. 28 S., R. 28 E., M. D. M., collected in 1924 by Chas. Morrice.

Lower end of shaft flattened, with broad impression for brachialis inferior, bordered externally by a low, rounded

²*Sula serrator* Gray, in Dieffenbach's Trav. New Zealand, vol. 2, App., January, 1843, p. 20.

margin, and internally by an abrupt plate that merges with the flattened, plane, narrowed, elongate pronator tubercle; a distinct cup-shaped depression below this tubercle, marked at upper side by a raised line; anterior end of pronator tubercle very slightly elevated; ulnar condyle elevated and protrudent



Fig. 4

Fig. 4.—Type of *Moris vagabundus*, anterior view, natural size.

anteriorly, irregularly globular at under side where it projects as a ball, sloping rapidly externally as an elongate ridge, with a large open olecranal depression behind; radial condyle elongate, compressed, elevated, curved inward at upper end, where the outer side and tip are under cut; tendinal attachments on outer face pronounced. Bone well fossilized, light brown in color.

Measurements.—Breadth across condyles 18.3 mm.; vertical diameter of ulnar condyle 7.2 mm.; vertical length of radial condyle 9.5 mm.

Remarks.—The present specimen while fragmentary exhibits the characters of the lower humerus that distinguish the gannets of the genus *Moris* from the boobies of the genus *Sula* in that the pronator attachment is elongate, narrow, and nearly plane, and the olecranal depression is without pronounced overhang on its inner side, where there are a few small foramina. In *Sula* the pronator attachment is shorter and is much rounded, and there is a very evident overhang on the inner side, with large easily evident foramina at this point.

The species here described is similar in the fragment at hand in conformation to the three living species of gannets, i.e. *M. bassana*, *M. capensis* and *M. serrator*, and likewise

resembles a broken humerus from the Miocene of Maryland that I have identified as *Moris loxostyla* (Cope),³ but differs from all these in its smaller size. It is approximately as large as the living *Sula piscator*. The following measurements of the transverse breadth of the lower end of the humerus across the condyles will show the relation in size of *vagabundus* to the other known gannets: *M. bassana* 23.7-24.3 mm.; *M. serrator* 22.5 mm.; *M. capensis* 22.5 mm.; *M. loxostyla* 21.1 mm.; and *M. vagabundus* 18.3 mm.

A fragmentary ulna from the same locality (U. S. Nat. Mus. Cat. No. 11971) as the type of *vagabundus* is of the proper dimension to come from this same species and is so identified. It resembles the ulna in the modern species of *Moris* in conformation, being distinguished only by smaller size. The proximal end of the bone is entirely gone, about seven-eighths of the specimen being present. The greatest transverse diameter of the shaft near its center is 7.4 mm. The transverse diameter of the distal end through the carpal ridge is 10.2 mm.

Sula willetti L. H. Miller⁴ from the Miocene of Lompoc, California, is about the same in size as the species here described. Dr. Loye Miller has kindly forwarded to me his original photographs of *S. willetti* from which the characters of the skeleton are more easily evident than in the published plates. Differences of the humerus in *Moris* and *Sula* have been noted above. In the skull of *Sula* the ramphotheca of the bill extends back to the cranio-facial hinge, the surface of the bone anterior to this point being roughened and cut by innumerable small channels or canals. In *Moris*, where the feathering of the forehead extends well beyond the cranio-facial hinge, the bone beneath this feathering is smooth and even, the roughening beginning only with the portion covered by ramphotheca. The difference is definite and easily seen on examining specimens. In both skull and humerus *willetti* is a true *Sula* and so has no bearing in considering the specific distinctness of *Moris vagabundus*.

³See Auk., 1926, p. 465.

⁴Carnegie Inst. Washington, Publ. No. 349, August, 1925, p. 112, pls. 3 and 8.

Moris vagabundus is the second true gannet now known from the Miocene, the other species *Moris loxostyla* (Cope) being represented in the Calvert formation of Chesapeake Bay, Maryland. With its description there are known three living and two extinct species in this genus.

Family ANATIDÆ

4. *Presbychen abavus* Wetmore, new genus and new species

Characters.—Similar to *Branta canadensis* (Linnæus),⁵ but lower end of tibio-tarsus with the tendinal bridge less oblique with relation to the axis of the shaft; raised border on inner side of anterior face of shaft relatively narrower, less rounded; and inner face of shaft at lower end less flattened, more rounded.

Description.—Type (figs. 5-7), lower end of right tibio-tarsus, U. S. Nat. Mus. No. 11973, from the upper level of the Temblor Miocene on **Sharktooth Hill**, about seven miles northeast of **Bakersfield**, **Kern County**, **California**, in Sec. 25, T. 28 S., R. 28 E., M. D. M., collected in 1924 by Charles Morrice.



Fig. 5



Fig. 6



Fig. 7

Figs. 5-7—Three views of type of *Presbychen abavus*, natural size.

Lower end of shaft strong, rounded on posterior surface and sides, broadly and deeply grooved anteriorly, this groove spanned at its lower end by a strong supra-tendinal bridge set at a very slight angle with the longitudinal axis of the shaft;

⁵*Anas canadensis* Linnæus, Syst. Nat., ed. 10, vol. 1, 1758, p. 123.

groove for peroneus profundus broad and open, inner anterior raised margin above anterior groove relatively narrow, raised as a rounded ridge; internal condyle elongate, produced farther anteriorly than external condyle, with a raised margin when viewed externally, and a broad, low, central tubercle; external condyle smaller, and more rounded; intercondylar sulcus broad and open, with a deep intercondylar fossa on anterior surface, angular at the bottom, from which there is gradual slope toward the external condyle, and more abrupt slope toward the internal condyle, the external walls being thicker; sulcus broadly open in front, with bottom rounded. Bone light brown in color, cracked but skillfully repaired, well fossilized.

Measurements. — Transverse breadth across condyles 18.6 mm.; transverse width of external condyle about 16.8 mm.; transverse width of internal condyle 19.0 mm.

Remarks.—This form in general is strongly suggestive of the modern Canada goose, differing in the particulars noted above, and in much larger size, *Presbychen* being intermediate in dimension between the largest of Canada geese and the whistling swan. The resemblance to living *Branta* is so strong as to suggest a bird of a form similar to that found in that group. The species here described is of particular interest as the oldest species of anserine bird yet described from the Miocene of North America, *Laornis edwardsianus* Marsh* from New Jersey, formerly considered Cretaceous but now placed in the Eocene, being very doubtfully related to the Anseriformes.

*Amer. Journ. Sci., ser. 2, vol. 49, 1870, pl. 206.